IN THE CLAIMS

Please cancel claims 3, 11, and 27.

Please amend claims 1, 8, 16, and 25 as follows:

1. (Currently Amended) A plasma ion implantation system comprising:

a vacuum chamber;

a plasma generator ~~configured to generate~~ generating ions comprising one of F, Si, O, Hf, Zr, Ti, Ta, Y, V, Sc, Ba, Sr, Ru, Al, Ga, In, Ge, C, and Sb ~~other than N~~ in the vacuum chamber;

a sample holder inside the vacuum chamber; and

a voltage source configured to provide a bias voltage between the sample holder and the vacuum chamber to attract ions to implant in a high-k dielectric layer of a sample positioned on the sample holder,

wherein the high-k dielectric layer has a k value greater than 9.

2. (Cancelled)

3. (Cancelled)

4. (Previously Presented) The plasma ion implantation system of claim 1, wherein the voltage source comprises a constant DC voltage source.

5. (Original) The plasma ion implantation system of claim 1, wherein the voltage source comprises an AC voltage source.

6. (Original) The plasma ion implantation system of claim 1, further comprising:

a vacuum pump for providing a specified pressure in the vacuum chamber.

7. (Original) The plasma ion implantation system of claim 1, further comprising:

a gas feed system for providing a gas to the vacuum chamber from which the plasma generator generates the ions.

8. (Currently Amended) A plasma ion implantation system comprising:

a vacuum chamber;

a vacuum pump configured to set a pressure in the vacuum chamber;

a gas feed system configured to provide a gas to the vacuum chamber;

a plasma generator ~~configured to generate~~ generating ions comprising one of F, Si, O, Hf, Zr, Ti, Ta, Y, V, Sc, Ba, Sr, Ru, Al, Ga, In, Ge, C, and Sb ~~other than N~~ from the gas;

a sample holder configured to hold a sample to be implanted; and

a constant DC voltage source configured to accelerate positive ions toward a high-k dielectric layer of the sample to implant the positive ions in the high-k dielectric layer and to repel negative ions from the sample,

wherein the high-k dielectric layer has a k value greater than 9.

9. (Original) The plasma ion implantation system of claim 8, wherein the DC voltage source is coupled to the sample holder and the vacuum chamber.

10. (Cancelled)

11. (Cancelled)

12. (Previously Presented) The plasma ion implantation system of claim 8, wherein the high-k dielectric layer comprises one of HfO_2, HfSiO, ZrO_2, ZrSiO, Ta_2O_5, La_2O_3, and AL_2O_3.

13. (Original) The plasma ion implantation system of claim 8, wherein the sample comprises a buffer layer proximate the high-k dielectric layer.

14. (Previously Presented) The plasma ion implantation system of claim 13, wherein the DC voltage source is configured to accelerate positive ions toward the buffer layer of the sample to implant the positive ions in the buffer layer.

15. (Original) The plasma ion implantation system of claim 14, wherein the buffer layer comprises one of TiN, HfN, TaN, ZrN, LaN, SiN, and TiSi.

16. (Currently Amended) A plasma ion implantation system comprising:

a vacuum chamber;

a vacuum pump configured to set a pressure in the vacuum chamber;

a gas feed system configured to provide a gas to the vacuum chamber;

a plasma generator ~~configured to generate~~generating ions from the gas, the ions comprising one of F, Si, O, Hf, Zr, Ti, Ta, Y, V, Sc, Ba, Sr, Ru, ~~B,~~ Al, Ga, In, Ge, C, and Sb;

a sample holder configured to hold a sample to be implanted; and

a voltage source configured to accelerate positive ions toward a first high-k dielectric layer of the sample to implant the positive ions in the first high-k dielectric layer and to repel negative ions from the sample,

wherein the first high-k dielectric layer has a k value greater than 9.

17. (Previously Presented) The plasma ion implantation system of claim 16, wherein the voltage source is configured to accelerate positive ions toward a second high-k dielectric layer of the sample adjacent the first high-k dielectric layer to implant the positive ions in the second high-k dielectric layer.

18. (Original) The plasma ion implantation system of claim 17, wherein the first high-k dielectric layer comprises one of $HfSiO_x$ and $ZrSiO_x$.

19. (Previously Presented) The plasma ion implantation system of claim 18, wherein the second high-k dielectric layer comprises one of HfO_2, $HfSiO_x$, ZrO_2, $ZrSiO_x$, Ta_2O_5, La_2O_3, and AL_2O_3.

20. (Previously Presented) The plasma ion implantation system of claim 19, wherein the voltage source is configured to accelerate positive ions toward a buffer layer of the sample adjacent the second high-k dielectric layer to implant the positive ions in the buffer layer.

21. (Original) The plasma ion implantation system of claim 20, wherein the buffer layer comprises at least one of TiN, HfN, TaN, ZrN, LaN, SiN, and TiSi.

22. (Original) The plasma ion implantation system of claim 20, wherein the buffer layer comprises a stack of layers.

23. (Previously Presented) The plasma ion implantation system of claim 21, wherein the voltage source is a constant DC voltage source.

24. (Original) The plasma ion implantation system of claim 21, wherein the voltage source is an AC voltage source.

25. (Currently Amended) A method of implanting ions in a sample, the method comprising:

positioning a sample comprising a high-k dielectric layer on a sample holder in a vacuum chamber, the high-k dielectric layer having a k value greater than 9;

providing a gas to the vacuum chamber;

setting a pressure in the vacuum chamber;

generating a plasma comprising ions comprising one of F, Si, O, Hf, Zr, Ti, Ta, Y, V, Sc, Ba, Sr, Ru, Al, Ga, In, Ge, C, and Sb in the vacuum chamber from the gas; and

accelerating positive ions in the plasma toward the sample to implant the positive ions in the high-k dielectric layer while repelling negative ions from the sample.

26. (Cancelled)

27. (Cancelled)

28. (Previously Presented) The method of claim 25, wherein accelerating positive ions in the plasma toward the sample comprises biasing the sample with a constant DC voltage.

29. (Previously Presented) The method of claim 25 wherein accelerating positive ions in the plasma toward the sample comprises biasing the sample with an AC voltage.

30. (Previously Presented) The method of claim 25, wherein accelerating positive ions in the plasma toward the sample to implant the positive ions in the sample comprises implanting the positive ions having a dose greater than $1x10^{13}$ ions/cm^2 and less than $1x10^{16}$ ions/cm^2.

31. (Previously Presented) The method of claim 25, wherein accelerating positive ions in the plasma toward the sample to implant the positive ions in the sample comprises accelerating the positive ions to have an implant energy greater than 5eV and less than 10keV.